

**Patent claims**

1. A/D converter comprising a self-oscillating modulator, said converter comprising
- 5 at least one self-oscillating loop comprising
- at least one forward path,
- at least one feedback path,
- wherein said at least one forward path comprises amplitude quantizing means
- 10 combined with time quantizing means and outputting at least one time and amplitude quantized signal.
2. A/D converter comprising a self-oscillating modulator according to claim 1, wherein said time quantizing means is arranged within said self-oscillating loop.
- 15 3. A/D converter comprising a self-oscillating modulator according to claim 1 or 2, wherein said time quantizing means comprises a high-speed sampling means.
4. A/D converter comprising a self-oscillating modulator according to any of the
- 20 claims 1-3,
- wherein said time quantizing means comprises a high-speed one-bit sampler.
5. A/D converter comprising a self-oscillating modulator according to any of the claims 1-4,
- 25 wherein said time quantizing means comprises latch-based circuitry comprising at least one latch, preferably at least two cascaded latches.
6. A/D converter comprising a self-oscillating modulator according to any of the claims 1-5,

wherein said amplitude quantizing means and said time quantizing means comprises a multi-bit A/D converter and where said feedback path comprises at least one D/A converter adapted for converting said time quantized signal into an analogue signal.

- 5     7. A/D converter comprising a self-oscillating modulator according to any of the claims 1-6,

wherein down sampling means are connected to said time quantizing means.

- 10    8. A/D converter comprising a self-oscillating modulator according to any of the claims 1-7,

wherein said A/D converter comprises two or more self-oscillating loops (SOL).

9. A/D converter comprising a self-oscillating modulator according to any of the claims 1-8,

- 15    wherein said amplitude time quantizing means comprises an analogue two-level self-oscillating pulse width modulator.

10. A/D converter comprising a self-oscillating modulator according to any of the claims 1-9,

- 20    wherein said amplitude time quantizing means comprises a multi-level self-oscillating pulse width modulator.

11. A/D converter comprising a self-oscillating modulator according to any of the claims 1-10,

- 25    wherein said A/D converter is single-ended.

12. A/D converter comprising a self-oscillating modulator according to any of the claims 1-11,

wherein said A/D converter is differential.

13. A/D converter comprising a self-oscillating modulator according to any of the claims 1-12,  
wherein said A/D converter comprises filtering means, said filtering means adapted for band pass filtering the time quantized signal.
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14. A/D converter comprising a self-oscillating modulator according to any of the claims 1-13, wherein the error originating from at least one time quantizer included in the at least one self-oscillating loop of the converter is suppressed by an error transfer function which, at low frequencies approximates the inverse of the open-  
10 loop transfer function of said at least one self-oscillating loop.
15. A/D converter comprising a self-oscillating modulator according to any of the claims 1-14, wherein the error originating from at least one time quantizer included in the at least one self-oscillating loop of the converter is suppressed by an error  
15 transfer function which, at high frequencies approximates 0 dB.
16. A/D converter comprising a self-oscillating modulator according to any of the claims 1-15,  
wherein said amplitude quantizing means comprises a limiter.
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17. A/D converter comprising a self-oscillating modulator according to any of the claims 1-16, wherein said amplitude quantizing means comprises a frequency compensated limiter.
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18. A/D converter comprising a self-oscillating modulator according to any of the claims 1-17,  
wherein a variable self-oscillating loop delay is applied.
19. A/D converter comprising a self-oscillating modulator according to any of the  
30 claims 1-18, wherein a variable delay in the feedback path.

20. A/D converter comprising a self-oscillating modulator according to any of the claims 1-19, wherein a transfer function  $H(s)$  is inserted in the forward path, thereby at least partly controlling the switch-frequency.

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21. Method of performing a A/D-conversion comprising the steps of representing a pulse width modulated representation as an analogue signal and quantizing the pulse width modulation in the time-domain.

10 22. Method of performing an A/D-conversion according to claim 21, whereby said pulse width modulated representation is obtained by means of at least one self-oscillating modulator comprising at least one self-oscillating loop.

15 23. Method of performing an A/D-conversion according to claim 21 or 22, whereby said quantization in the time domain is performed within said at least one self-oscillating loop.

24. Method according to any of the claims 21-23, whereby said method is applied in an A/D converter according to any of the claims 1-20.